REMARKS

In the last Office Action, claims 13-28 were rejected under 35 USC §102(b) as being clearly anticipated by any one of US 6,838,685 and US 2005/0236587, both to Kodama et al., and JP 2001-345360. Claims 13-17 and 19-28 were further rejected under 35 USC §102(b) as being anticipated by US 5,574,280 to Fujii et al. ("Fujii"), and claim 18 was further rejected under 35 USC §103(a) as being unpatentable over Fujii. The Examiner requested applicants to provide an English translation of JP 2001-345360.

In accordance with this response, claims 13, 15, 19 and 23 have been amended, claims 14, 22, 26 and 27 have been canceled and new claims 29-35 have been added. The specification has been revised in minor editorial respects and to better conform to U.S. practice.

In response to the Examiner's request for an English translation of JP 2001-345360, the requested translation is being submitted concurrently herewith together with an Information Disclosure Statement listing this document and others.

The present invention relates to an ion beam device and an ion beam processing method for processing a sample to form an observation cross section and for removing a damaged layer formed on the cross section during such processing. In accordance with the invention, a liquid metal ion beam is

irradiated on a specific portion of a sample to form a cross section of the sample, and a gaseous ion beam is then scanned over a prescribed region of the cross section, using a gaseous ion beam focused to a prescribed diameter smaller than the size of the cross section, for removing a damaged layer on the prescribed region.

Independent claims 13 and 19 have been amended to specify that the gaseous ion beam is focused to a prescribed diameter that is smaller than the size of the cross section which, as described in the specification, enables the gaseous ion beam to be irradiated principally on the observation region of the cross section and not on neighboring surfaces of the cross section and sample, thereby reducing the emission of secondary particles from the sample which would become reattached to the observation region of the cross section hindering observation of the cross section. None of the prior art references discloses or suggests a gaseous ion beam focused to a diameter smaller than the size of the cross section.

JP 2001-3454360 discloses an ion beam device and ion beam processing method using a first ion beam to form an observation section of a sample, and a second ion beam to remove elemental species of the first ion beam at the observation section. For example, the reference discloses using a gallium ion beam to form the observation section and

an argon ion beam for removing gallium ions that were doped into the observation section during formation of the observation section. However, there is no disclosure whatsoever in the reference that the diameter of the second ion beam is smaller than the size of the cross section of the observation section.

Similarly, the two Kodama references, US 6,838,685 and 2005/0236587, disclose ion beam devices and ion beam processing methods in which a damaged layer formed on an observation section of a sample by irradiation of a first ion beam, such as a gallium ion beam, is removed by irradiating the observation section with a gaseous ion beam, such as an argon ion beam. In neither reference is there any disclosure of focusing the gaseous ion beam to a diameter smaller than the size of the observation section.

Likewise, Fujii discloses an ion beam device and an ion beam processing method in which a sample is irradiated with a liquid metal ion beam to form an observation section and then irradiated with a gaseous ion beam to remove a damaged layer on the cross section. While Fujii discloses that the diameter of the gaseous ion beam "can be a little bit bigger than that of the liquid ion beam 11, but, of course, should be smaller than the sample 5" (column 4 lines 28-33), Fujii does not disclose that the diameter of the gaseous ion beam is smaller than the size of the cross section. As shown

in the embodiments of Fig. 6A-6F the gaseous ion beam from the gaseous ion beam irradiation unit 3 spans the entire observation section and, according to Fujii, is smaller than the sample 5. By contrast, in the present invention, the gaseous ion beam is irradiated basically only on the area to be observed to remove the damaged layer created by the liquid metal ion beam, thereby preventing secondary particles from being emitted at adjacent surfaces and re-attaching to the observation section.

In short, Fujii disclosed various measures for removing metal ions that become doped into an area of the sample irradiated with a focused liquid metal ion beam so that the removed metal ions do not re-attach to the observation section. On the other hand, in the present invention, the diameter of the gaseous ion beam is made smaller than the size of the cross section so that the damaged layer on a prescribed region of the cross section can be removed without affecting neighboring areas of the cross section thereby reducing the likelihood of re-attachment of metal ions to the cross section.

In view of the foregoing, the application is now believed to be in allowable form. Accordingly, favorable reconsideration and passage of the application to issue are respectfully requested.

Respectfully submitted,

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April 5, 2007
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